

DEEP-SEA TUBIFICIDAE (OLIGOCHAETA) FROM THE GULF OF MEXICO

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Abstract.—Four bathyal species of the subfamily Phallodrilinae (*Phalldrillus constrictus*, n. sp., *P. grasslei* Erséus, 1984, *Bathydrillus connexus*, n. sp., and *B. longiatratus* Erséus, 1983) are reported from the northern part of the Gulf of Mexico. *Phalldrillus constrictus* is characterized by bifid penial setae (three per bundle), and heavily muscular atria and copulatory sacs, the latter enclosing pendant penes. *Bathydrillus connexus*, which belongs to the '*B. adriaticus* group,' has more or less single-pointed setae in postclitellar segments, and blunt, somewhat chisel-shaped penial setae (two, occasionally three, per bundle).

Marine oligochaetes collected during a study of the northern Gulf of Mexico continental slope were sent to the author for identification from LGL Ecological Research Associates, Inc. (Bryan, Texas). The material contained four bathyal species belonging to the subfamily Phallodrilinae, of which two are new to science. The taxonomy of these species is treated here. Other tubificids found are *Limnodriloides monothecus* Cook, 1974 (Limnodriloidinae) and a species of *Tubificoides* (Tubificinae), but they occurred only at stations of about 350 m depth. The latter of these two will be treated by the author elsewhere.

The specimens studied here were collected by boxcore sampling along two transects, south of Louisiana and south of western Florida, respectively. Some worms were stained with paracarmin by the author; all individuals were then mounted whole in Canada balsam. The material is deposited at the National Museum of Natural History (USNM), Smithsonian Institution, Washington, D.C.

Phalldrillus Pierantoni, 1902

(Generic definition: see Erséus 1984a)

Phalldrillus constrictus, new species

Figs. 1A-C

Holotype.—USNM 113701, from S of W

Florida, 28°16'42"N, 86°15'06"W, 625 m, 16 Apr 1984.

Paratypes.—USNM 114501-114502, 2 specimens: 1 from 28°07'05"N, 86°19'15"W, 860 m, 18 May 1985; 1 from 28°21'45"N, 86°48'05"W, 852 m, 20 May 1985.

Description.—One paratype 3.2 mm long, 20 segments (other specimens not complete). Width at XI (compressed, whole-mounted specimens) 0.14-0.17 mm. Clitellum extending over ½X-½XII. Somatic setae (Fig. 1A) bifid, with upper tooth thinner and slightly longer than lower, at least anteriorly. These setae 28-47 μm long, about 1-1.5 μm thick, 3-4 per bundle anteriorly, 2 per bundle in postclitellar segments. Penial setae (Fig. 1B; C, ps) slender, bifid, with upper tooth thinner and shorter than lower, about 45-50 μm long, 2 μm thick, 3 per bundle. Male pores paired ventrally and posteriorly in XI. Spermathecal pores paired in line with ventral setae, anteriorly in X.

Pharyngeal glands in IV-VI. Male genitalia (Fig. 1C) paired. Vas deferens not observed. Atrium oval, 53-63 μm long, 33-37 μm wide, with 3-8 μm thick lining of muscles, and ciliated and somewhat granulated inner epithelium. From ectal end of atrium short, narrow duct leading into oval, heavily muscular copulatory sac, 47-49 μm long, 30-40 μm wide. Penis present, narrow and pendant within copulatory sac. Ante-

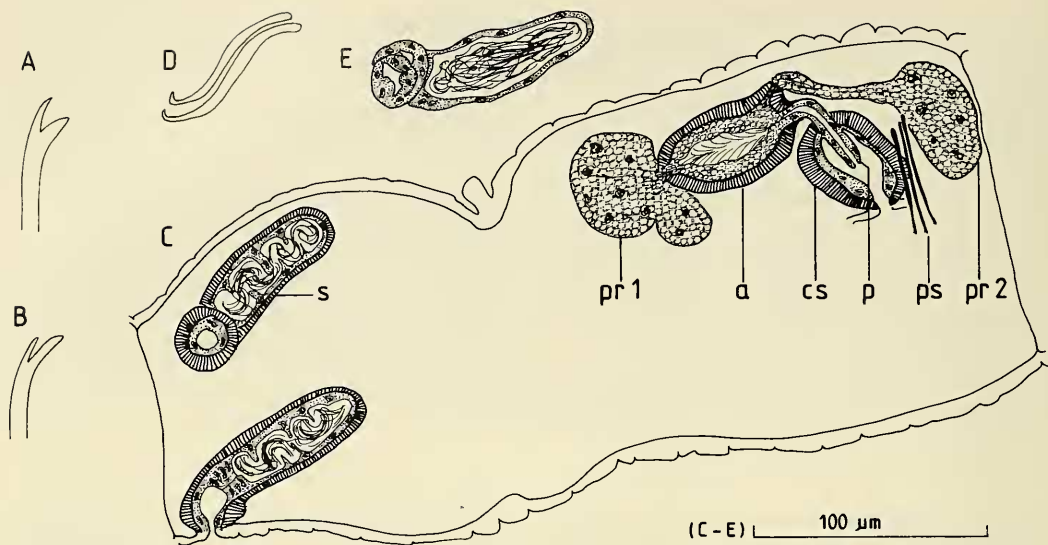


Fig. 1. A-C, *Phallodrilus constrictus*, n. sp.: A, Free-hand drawing of somatic seta; B, Free-hand drawing of penial seta; C, Somewhat ventral view of spermathecae and one of male ducts in segments X-XI (note: septum between X and XI not observed). D-E, *Phallodrilus grasslei* Erséus: D, Penial setae; E, Spermatheca. Abbreviations: a atrium; cs copulatory sac; p penis; pr 1 anterior prostate gland; pr 2 posterior prostate gland; ps penial seta; s spermatheca.

rior prostate gland attached to apex of atrium. Posterior prostate attached to ectal end of atrium, near exit of narrow duct. Spermathecae (Fig. 1C, s) cylindrical, 82–94 μm long, 21–28 μm wide, consisting of short, partly hollow ducts, and slender ampullae, all with 2–4 μm thick lining of muscles; sperm in small compartments within ampullae.

Remarks. — *Phallodrilus constrictus* is named for the distinct ‘constriction’ on the male duct between the atrium proper and the muscular copulatory sac. The species bears resemblance to *P. vulnus* Erséus, 1983 and *P. cristolatus* Erséus, 1983, two bathyal species from the NE Atlantic which also have bifid penial setae and penial structures (latter termed pseudopenes by Erséus 1983). [Note that the illustrations of *P. vulnus* and *P. cristolatus* were transposed in the original paper; the legend of Erséus’ (1983) fig. 1 actually refers to the drawing of fig. 2 and vice versa.] *Phallodrilus constrictus* is, however, easily distinguished from both of these

by its very conspicuous, muscular copulatory sacs and by the morphology of its spermathecae. Another close relative of the new species is probably *P. davisi* Erséus, 1984, known from the continental shelf off Massachusetts (Erséus 1984c). It has well developed copulatory sacs and penes, as well as compartmented spermathecae. The male ducts and the spermathecae of *P. davisi* are, however, not as muscular as those of *P. constrictus*, and the species lacks penial setae.

Distribution and habitat. — Northern Gulf of Mexico. Upper continental slope sediment, 625–860 m.

Phallodrilus grasslei Erséus, 1984

Fig. 1D, E

Phallodrilus grasslei Erséus, 1984b:101–103, figs. 1–3.

Type material. — USNM 96493–96495, holotype and 2 paratypes from 1789 m depth, S of Massachusetts, NW Atlantic (see Erséus 1984b).

New material examined. — USNM 113702, 1 specimen from S of Louisiana, 28°04'18"N, 86°34'24"W, 1330 m, 17 Apr 1984.

Remarks. — This species was previously known only from off Massachusetts. The new individual conforms well to the original description. For instance it has sigmoid, hooked penial setae, 2 per bundle (Fig. 1D), which is the most striking feature of *P. grassei*. The spermathecal ampullae of the original material had thick walls (Erséus 1984b: fig. 1). The spermathecae of the new material are, however, more thin-walled (Fig. 1E).

Distribution and habitat. — Northern Gulf of Mexico (new record), S of Massachusetts. Continental slope sediments, known from 1330–1789 m depth.

Bathydrilus Cook, 1970

(Generic definition: see Erséus 1981, and modification by Erséus 1983)

Bathydrilus connexus, new species

Fig. 2A–C

Holotype. — USNM 113703, from S of W Florida, 28°09'36"N, 86°25'00"W, 845 m, 17 Apr 1984.

Paratypes. — USNM 113704–113710 and 114503–114505, 10 specimens from S of W Florida and Louisiana: 1 from 26°57'48"N, 89°31'00"W, 2490 m, 28 Nov 1983; 2 from 26°58'00"N, 89°31'48"W, 2467 m, 29 Nov 1983; 1 from 26°56'54"N, 89°36'12"W, 2377 m, 13 Apr 1984; 2 from 28°16'42"N, 86°15'06"W, 625 m, 16 Apr 1984; 1 from 28°00'24"N, 86°38'48"W, 2853 m, 18 Apr 1984; 2 from 28°14'50"N, 86°09'47"W, 618 m, 16 May 1985; and 1 from 28°00'10"N, 86°38'43"W, 2902 m, 21 May 1985.

Description. — Length (2 complete worms) 7.8–12.9 mm, 43–55 segments. Width at XI (compressed, whole-mounted specimens) 0.23–0.39 mm. Epidermal glands not observed. Clitellum extending over ½X–XII. Somatic setae (Fig. 2A, B) 45–75 μm long, 2.5–3 μm thick, 2–3(4) per bundle ante-

riorly, 2(3) per bundle in postclitellar segments. In segments II–VIII, setae bifid, with upper tooth thinner and shorter than lower (Fig. 2A). From IX, setae sharply single-pointed or with very much reduced upper tooth (Fig. 2B). Penial setae (Fig. 2C, ps) straight or somewhat curved, (3) per bundle, 60–85 μm long, entally 5–6 μm wide (ectally narrower), with blunt, somewhat chisel-shaped tips directed towards and located near midventral line. Male pores paired in line with ventral somatic setae, posteriorly in XI. Spermathecal pores paired in lateral lines, in anteriormost part of X. In several specimens, male and spermathecal pores elevated on bulbous protuberances.

Pharyngeal glands in IV–VII. Male genitalia (Fig. 2C) paired. Vas deferens 7–12 μm wide, slightly longer than atrium, entering latter somewhat ectal to middle, together with anterior prostate gland. Atrium spindle-shaped, 100–175 μm long, 50–56 μm wide at middle, with very thin outer lining of muscles and ciliated inner epithelium. Middle part of atrium densely granulated. Posterior prostate glands attached to apical, inner end of atrium. Ectally, atrium terminating in simple pseudopenis. Spermathecae (Fig. 2C, s) with short, indistinct ducts and large, sacciform ampullae; latter with a few large roundish 'spermatozeugmata.'

Remarks. — This species is named *connexus* (Latin meaning 'linked together' or 'bordering upon'), because of its close relationship with a whole group of, largely shallow-water, species of *Bathydrilus* [*B. adriaticus* (Hrabe, 1971), *B. litoreus* Baker, 1983, and others] characterized by more or less erect, spindle-shaped atria, bisetal or trisetal penial bundles, and sacciform spermathecae with sperm arranged in 'spermatozeugmata.' *Bathydrilus connexus* is in fact very similar to *B. adriaticus*, but is regarded as a separate species because of the detailed morphology of its setae. Sharply single-pointed postclitellar setae (Fig. 2B), are not known from any other member of

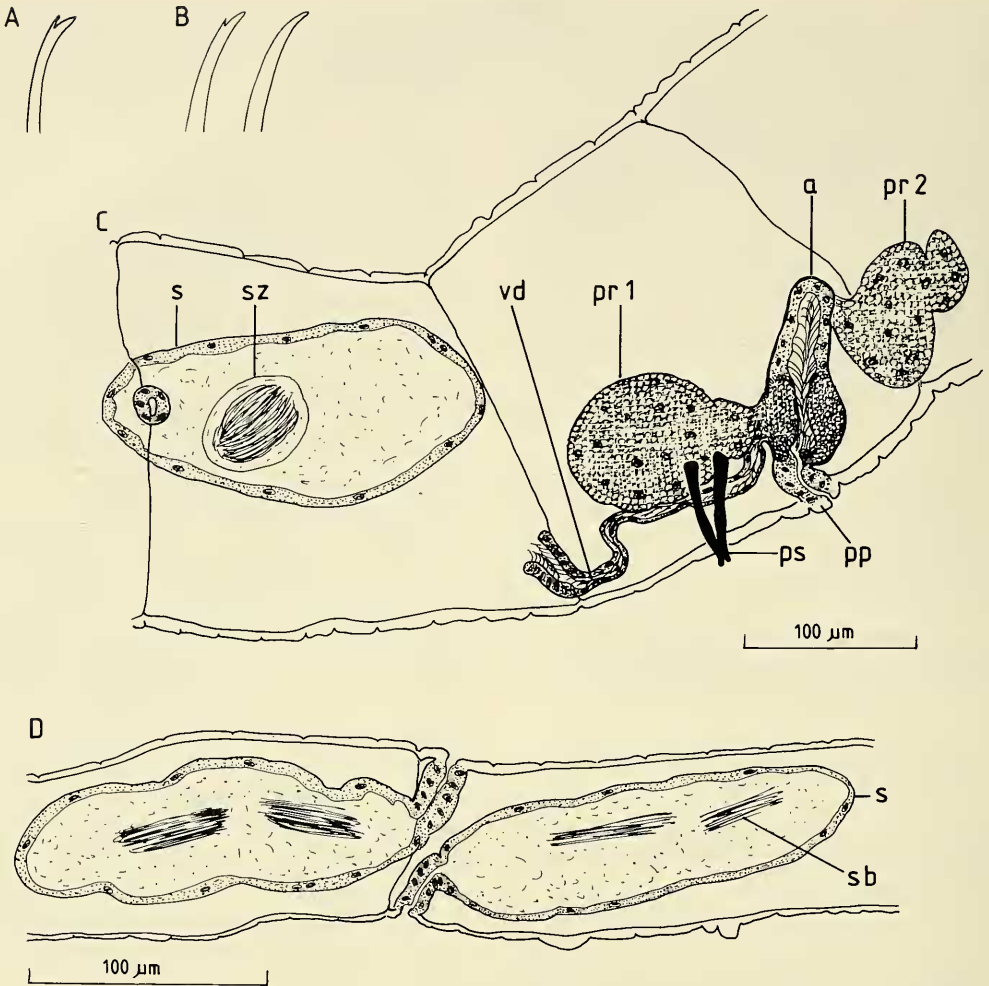


Fig. 2. A–C, *Bathydriilus connexus*, n. sp.: A, Free-hand drawing of anterior seta; B, Free-hand drawing of postclitellar setae; C, Lateral view of spermatheca and male duct in segments X–XI. D, *Bathydriilus longiatriatus* Erséus: spermathecae in segments IX–X. Abbreviations: a atrium; pp pseudopenis; pr 1 anterior prostate gland; pr 2 posterior prostate gland; ps penial seta; s spermatheca; sb sperm bundle; sz 'spermatozeugma'; vd vas deferens.

this group. Moreover, the penial setae of the new species are blunt, those of *B. adriaticus* are pointed.

Distribution and habitat.—Northern Gulf of Mexico. Continental slope sediments, known from 618–2902 m depth.

Bathydriilus longiatriatus Erséus, 1983

Fig. 2D

Bathydriilus longiatriatus Erséus, 1983:143–144, fig. 10.

Type material.—USNM 72988, holotype from about 2850 m depth, N of Surinam (see Erséus 1983).

New material examined.—USNM 113717–113722 and 114506, 7 specimens from S of W Florida and Louisiana: 3 from 26°58'00"N, 89°31'48"W, 2467 m, 29 Nov 1983; 1 from 27°28'24"N, 89°46'48"W, 1390 m, 13 Apr 1984; 1 from 28°09'36"N, 86°25'00"W, 845 m, 17 Apr 1984; 1 from 27°27'41"N, 89°47'19"W, 1506 m, 15 Nov

1984; 1 from 28°35'22"N, 86°46'26"W, 622 m, 13 May 1985.

Remarks.—*Bathydrius longiatratus* was originally described on the basis of a single specimen from off Surinam. Very long, muscular atria (about 300–400 μm long in new material), extending to the end of segment XII, characterize the species. The holotype was precopulatory, but in some of the new individuals the spermathecae contain an amorphous granular mass with a few bundles of sperm (Fig. 2D). Some of the worms from the Gulf of Mexico have fine particles adhering to the cuticle.

Distribution and habitat.—Northern Gulf of Mexico (new record) and N of Surinam. Continental slope sediments, known from 622–2953 m depth.

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